

TRENCH MOSFET HAVING IMPLANTED DRAIN-DRIFT REGION AND PROCESS FOR MANUFACTURING THE SAME

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Abstract

5 A trench MOSFET is formed in a structure which includes a P-type epitaxial layer overlying an N⁺ substrate. A trench is formed in the epitaxial layer. A deep implanted N layer is formed below the trench at the interface between the substrate and the epitaxial layer, and N-type dopant is implant through the bottom of the trench to form an N region in the epitaxial layer below the trench but above and separated
10 from the deep N layer. The structure is heated to cause the N layer to diffuse upward and the N region to diffuse downward. The diffusions merge to form a continuous N-type drain-drift region extending from the bottom of the trench to the substrate. Alternatively, the drain-drift region may be formed by implanting N-type dopant through the bottom of the trench at different energies, creating a stack of N-type
15 regions that extend from the bottom of the trench to the substrate.